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May 20, 2002
In reply refer to 2002RC1681

Mr. Gerard Abrams
California Environmental Protection Agency
Department of Toxic Substances Control
8800 Cal Centre Drive
Sacramento, CA 95826-3200

BOEING

Subject: Sampling Groundwater for 1,4-dioxane at the FSDF
Santa Susana Field Laboratory, Ventura County, CA

Dear Mr. Abrams:

The Boeing Company submitted a work plan (MWH, 2001a) for DTSC's review and approval to characterize the Chatsworth Formation Operable Unit at the Former Sodium Disposal Facility (FSDF) in Area IV of the Santa Susana Field Laboratory (SSFL). DTSC subsequently reviewed and provided conditional approval of the work plan (DTSC, 2002). The conditions that DTSC established in its approval letter were twofold and requested that all of the saturated ports from the discrete interval systems (FLUTes) to be installed in the designated wells at the FSDF be analyzed for both perchlorate and 1,4-dioxane. Boeing agrees to sample all of the saturated ports of the FLUTes for perchlorate, but does not believe that all of the saturated ports of the FLUTes should be sampled for 1,4-dioxane. We agree to sample all of the saturated ports for perchlorate only because we believe that this activity will provide further evidence that the occurrences of perchlorate encountered in Simi Valley groundwater are not the result of groundwater transport from the FSDF.

However, we do not believe that there are any data to support DTSC's request that all of saturated ports be sampled for 1,4-dioxane in lieu of the sampling proposed in the work plan, which proposed to sample a single port from each of the wells designated to receive a FLUTe. We believe that the approach provided in the work plan is appropriate. The approach uses volatile organic compound (VOC) data and other hydraulic data that are to be collected from all of the saturated ports in the FLUTes to identify the most appropriate port to be sampled for 1,4-dioxane from each designated well. The criteria used to decide which port would be sampled was recently transmitted to DTSC in the proposed sampling plan for the FLUTes that are currently installed in the northeast area of the SSFL (MWH, 2002b). We believe that sampling

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all of the saturated ports for 1,4-dioxane analysis is not warranted because of the following:

- The Chatsworth Formation beneath the FSDF is primarily impacted by trichloroethylene (TCE). Work reviewed and performed on solvent stabilizers, which include 1,4 dioxane detected in groundwater at chlorinated solvent sites has primarily been associated with the occurrence of 1,1,1-tricloroethane (TCA). Documentation supporting this statement can be found in a white paper on solvent stabilizers prepared by Thomas Mohr of the Santa Clara Valley Water District (Mohr, 2002. [http//.scvwd.dst.ca.us/stabilizers]). This work also indicates that 1,4-dioxane was not used extensively in TCE.

- Sampling and laboratory analysis of groundwater from nine existing Chatsworth Formation monitoring wells at the FSDF for the presence and concentration of 1,4-dioxane during 2001 showed none to be present above the method detection limit of 20 micrograms per liter (µg/L). A summary of these sampling results is provided below.

Analysis of Groundwater Samples From Wells at FSDF for 1,4-dioxane in 2001

Well	Number of Sampling Events 2001	Analytical Results (µg/L)
RD-13	2	<20
RD-22	2	<20
RD-33A	1	<20
RD-33B	2	<20
RD-33C	2	<20
RD-50	1	<20
RD-57	1	<20
RD-64	1	<20
RD-65	1	<20

- The transport of 1,4-dioxane in groundwater in the fractured porous bedrock that underlies the FSDF is fundamentally different than in granular aquifers. The Expert Groundwater Panel comprised by Drs. Beth Parker and John Cherry from the University of Waterloo and Dr. Dave McWhorter, Professor Emeritus from Colorado State University, has demonstrated that chemicals solubilized in groundwater diffuse into the porous sandstone matrix underlying the SSFL through molecular diffusion. Matrix diffusion retards the transport of these chemicals by factors of 10,000 or more compared to the average linear groundwater velocity (Montgomery Watson and Expert Panel, 2000). Steven Foster initially documented molecular diffusion into fractured porous bedrock for hydrophilic chemicals (i.e., tritium and nitrate) in 1975 (Foster, 1975). Therefore, although 1,4-dioxane is miscible in groundwater (i.e., hydrophilic), it will also diffuse into the porous bedrock that underlies the SSFL as have

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other chemicals. So, it is expected that 1,4-dioxane will remain local to the release location due to diffusion into the matrix and will not be transported great distances as is the case in granular aquifers.

- Groundwater monitoring data from across the site confirm that 1,4-dioxane is not a chemical that is widely prevalent across the SSFL and, when it is detected, is found in concentrations almost exclusively in the tens of micrograms per liter. The recently issued 2001 Annual Groundwater Report (Haley & Aldrich (H&A), 2002a) provide data on the occurrence and concentration of 1,4-dioxane in SSFL groundwater dating back to 1995/96 (see figures F-86 through F-102 in Appendix F and Figure 13). Additionally, 1,4-dioxane sampling results provided in the Draft Shallow Groundwater Technical Memorandum (MWH, 2001a) and the 2001 Report on Appendix IX Groundwater Monitoring (H&A, 2002b) provide further evidence that 1,4-dioxane is neither prevalent nor present at elevated concentrations.

BOEING

In summary, Boeing agrees with sampling all of the saturated ports from the FLUTes at the FSDF for perchlorate and believes that such sampling for 1,4-dioxane is not warranted because of the reasons noted above. Please call me (818/586-5695) or Rich Andrachek of MWH (925/975-3518) if you have any questions or comments.

Sincerely,

Arthur J. Lenox
Environmental Remediation

AJL:dr

SHEA-095254

cc: K.Baker, DTSC
P.Batarseh, DTSC
T. Seckinton, DTSC
P. Bailey, DTSC
R. Andrachek, MWH
S. Clark, Haley and Aldrich

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Foster, S.S.D., 1975. The Chalk Groundwater Tritium Anomaly. A Possible Explanation, Journal of Hydrology, v.25, pp 159-165.

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MWH, 2001a. *Work Plan for Additional Field Investigations Former Sodium Disposal Facility, Chatsworth Formation Operable Unit.* December.

MWH, 2001b. *Draft Shallow Groundwater Investigation Technical Memorandum, Santa Susana Field Laboratory.* August.

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